



REMR TECHNICAL NOTE CS-MR-4.4

CLEANING CONCRETE SURFACES

PURPOSE: To provide information on different techniques and materials for removing stains from concrete surfaces.

APPLICATION: Almost all stains can be removed from concrete if the type of stain can be identified and the correct removal methods selected.

BACKGROUND: Because of its porosity, concrete surfaces are easily stained. Most of these stains can be removed. A few stubborn stains, however, will leave traces.

Stains should be removed as soon as possible **to** prevent farther migration into the concrete. Also, time causes stains to bind more tightly to the concrete or to undergo a chemical change, thus making removal difficult.

The first step is to identify the stain and then choose a cleaning agent and method accordingly. If the stain is impossible to identify, cleaning methods and materials should be tested in an inconspicuous area.

Removal agents should be used in the following order on unidentified stains: (1) organic solvents, (2) oxidizing bleaches, like those based on peroxides or hypochlorides, (3) reducing bleaches, some of which are used in an acidic medium, and (4) acids and other acidic materials.

TECHNIQUES FOR REMOVING STAINS:

1. Water washing: A fine mist spray is recommended, as excessive water pressure can drive the stain farther into the concrete. Washing should be done from the top of the structure down. If the water alone is not cleaning the concrete, it can be used in conjunction with the following in the order listed: a soft brush, a mild soap, a stronger soap, ammonia, or vinegar.

2. Poultice: Diatomaceous earth, fly ash, ground limestone, silica flour, talc and similar materials are mixed with a solvent to form a paste. The paste is applied to the stain; the liquid portion migrates into the concrete, dissolves the staining material, moves back through the concrete surface into the poultice material, from which it evaporates, leaving the stain in the poultice. After the poultice dries, it is brushed away. Usually more than one application is necessary. Shredded paper towels, old newspapers, floor oil absorbents, and kitty litter have been used to make poultices.

3. Chemical: Organic solvents can usually be used with little dilution. Inorganic solvents such as ammonium hydroxide, sodium hypochlorite, and hydrogen peroxide can be purchased in ready-mixed solutions; other organic solvents

can be purchased as solids and then mixed with water according to manufacturer's directions.

Acidic materials will etch the concrete surface. Saturating the surface with water before applying the acid solution and flushing it thoroughly after completing the cleaning reduces the amount of etching.

A concern with chemical cleaning is contamination from soluble salts. Some chemicals contain salts; others form salts through a reaction with the material being cleaned. A build-up of salts in the pores of concrete can damage it.

4. Mechanical: Sometimes power tools (grinders, buffers, chisels, brushes), steam cleaners, or flame cleaners are required to remove the more stubborn stains from concrete. Some of these methods remove the concrete along with the stain. If a roughened or uneven surface is not a problem, chiselling or grinding can be effective. A flame cleaner will burn off organic material that does not respond to solvents. However, the heat can cause the concrete surface to scale off. Steam is especially good for removing chewing gum from paving; however, in most applications it is comparatively expensive.

REMOVING SPECIFIC STAINS:

1. Rust: If the stain is light or shallow, mop the surface with a solution of 1 lb oxalic acid per gal of water. Wait two or three hours, and then scrub the surface with stiff brushes while rinsing with clear water.

If the stain is deep, use a poultice. Mix 11 oz (by weight) sodium citrate and 2 qt lukewarm water. Add 2 qt 12 oz glycerol. Make a stiff poultice with diatomaceous earth or talc; trowel over the stain. Leave the poultice for 2 or 3 days. Repeat if necessary.

2. Oil: If the oil is freshly spilled, soak it up with absorbent paper; do not wipe it up. Cover the stain with a dry powdered material such as portland cement, hydrated lime, cornmeal, or cat litter. Wait approximately 24 hours, then sweep it up. Scrub the remaining stain with scouring powder or a strong soap solution.

If the stain is old, cover it with flannel soaked in a solution of equal parts acetone and amyl acetate. Cover the flannel with a pane of glass or a thin concrete slab for 10 to 15 min. Repeat if necessary. Rinse when the cleaning process is complete.

3. Grease: Scrape the grease from the surface. Scrub with scouring powder, strong soap or detergent, or sodium orthophosphate. If the stain persists, make a stiff poultice with one of the chlorinated solvents. Repeat if necessary. Rinse.

4. Dirt: Most dirt can be removed with plain water or with a soft brush and water containing a mild soap. If a stronger solution is necessary, use 19 parts water to 1 part hydrochloric acid. If the dirt contains a lot of oil, use the methods for removing lubricating oil. Also, steam cleaning is generally effective for removing dirt.

If the dirt is clay, scrape off all that has hardened. Scrub the stain with hot water containing sodium orthophosphate.

5. Mildew: Mix 1 oz each (by weight) powdered detergent and sodium orthophosphate, 1 qt commercial sodium hypochlorite solution, and 3 qt water. After applying the mixture, wait a few days and then scrub the area. Rinse with clear water. Caution: sodium hypochlorite solution bleaches colored clothing and may corrode metal.

6. Graffiti: Apply a proprietary cleaner that contains an alkali, a solvent, and detergent. After scrubbing the graffiti with a brush, leave the cleaner in place for the time indicated by the manufacturer. Rinse thoroughly. Avoid contact with skin.

7. Asphalt: Chill molten asphalt with ice (in summer). Scrape or chip it off while it is brittle. Then scrub the area with abrasive powder and rinse thoroughly with water.

Do not apply solvents to emulsified asphalt as they will carry the emulsions deeper into the concrete. Scrub with scouring powder and rinse with water.

Use a poultice of diatomaceous earth or talc and a solvent to remove cutback asphalt. When the poultice has dried, brush it off. Repeat if necessary.

8. Chewing gum: Chill the gum with ice or commercial aerosol freezing agents. Chip and scrape off as much as possible. Apply carbon disulfide, chloroform, or denatured alcohol alone or in a poultice. Steam cleaning is effective in removing chewing gum that has been walked into the surface of concrete.

SAFETY WITH CHEMICALS

1. When using chemicals, wear gloves, face shields or masks. Have soap, water, and towels available for prompt washing and rinsing in case of emergency.

2. Do not save unused portions of stain-removal solutions; discard safely.

3. Do not store any chemicals in unmarked containers.

4. This technical note discusses the use of chemical substances that, if used improperly, may have extremely adverse health and safety impacts. Reasonable caution should guide the use of such materials. Manufacturer's directions and recommendations for the protection of occupational health and safety should be carefully followed. Material Safety Data Sheets (MSDS) should be obtained from the manufacturers of such materials. In cases where the effects of a chemical substance on occupational health and safety are unknown, chemical substances should be treated as potentially hazardous or toxic materials.

ENVIRONMENTAL

In addition to the potential extremely adverse worker health and safety effects, improper handling and disposal of cleaning materials and their associated solvents may have adverse environmental effects. Reasonable caution should guide the use of cleaning activities involving the use of potentially

hazardous and toxic chemical substances. Manufacturer's directions and recommendations for the protection of environmental quality should be carefully followed. The MSDS should be consulted for detailed handling and disposal instructions. The MSDS also provides guidance on appropriate responses in the event of spills. In cases where the effects of a chemical substance on environmental quality are unknown, chemical substances should be treated as potentially hazardous or toxic materials. Residual cleaning solutions may be classified as a hazardous waste, requiring special disposal considerations. The MSDS will generally recommend that Federal, state and local regulations be consulted prior to determining disposal requirements. Improper handling and disposal of waste materials may result in civil and criminal liability.

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